

Katherine S. Nelson

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RESEARCH INTERESTS

Socio-environmental resilience; sustainable development; social vulnerability; food and water security; urban flood adaptation; hierarchical Bayesian modeling; spatial analysis and GIS

APPOINTMENTS

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|----------------|---|
| 2018 - present | Assistant Professor, Department of Geography and Geospatial Sciences, Kansas State University |
| 2011 - 2013 | Lab Manager and Senior Scientist, Nano Research Facility, Washington University in St. Louis |
| 2010 - 2011 | Research Scientist, Nano Research Facility, Washington University in St. Louis |

EDUCATION

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| 2018 | Ph.D. in Environmental Engineering, Vanderbilt University |
| 2009 | M.S. in Environmental Engineering, Washington University in St. Louis |
| 2006 | B.S. in Environmental Engineering, University of Oklahoma |

PUBLICATIONS

Peer-Reviewed Journal Articles

- 2019 Burchfield, E.K., **Nelson, K.S.**, & Spangler, K. (2019). The impact of agricultural landscape diversification on U.S. crop production. *Agriculture, Ecosystems & Environment*. <https://doi.org/10.1016/j.agee.2019.106615>
- 2019 Gillespie-Marthaler, L., **Nelson, K.**, Baroud, H., & Abkowitz, M. D. (2019). Selecting Indicators for Assessing Community Sustainable Resilience. *Risk Analysis*. <https://doi.org/10.1111/risa.13344>
- 2019 **Nelson, K.**, Gillespie-Marthaler, L., Baroud, H., Abkowitz, M., & Kosson, D. (2019). An integrated and dynamic framework for assessing sustainable resilience in complex adaptive systems. *Sustainable and Resilient Infrastructure*, 1-19. <https://doi.org/10.1080/23789689.2019.1578165>
- 2018 Gillespie-Marthaler, L., **Nelson, K.S.**, Baroud, H., Kosson, D. S., & Abkowitz, M. D. (2018). An Integrative Approach to Conceptualizing Sustainable Resilience. *Sustainable and Resilient Infrastructure*. <https://doi.org/10.1080/23789689.2018.1497880>

- 2017 **Nelson, K. S.** & Burchfield, E.K. (2017). Effects of the Structure of Water Rights on Agricultural Production During Drought: A Spatiotemporal Analysis of California's Central Valley. *Water Resources Research*, 53. doi:10.1002/2017WR020666
- 2017 **Nelson, K. S.**, Camp, J. V., Philip, C. E., & Abkowitz, M. D. (2017). Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures. *Transportation Research Record: Journal of the Transportation Research Board*, (2611), 11-18.
- 2016 Dundon, L. A., **Nelson, K. S.**, Camp, J., Abkowitz, M., & Jones, A. (2016). Using Climate and Weather Data to Support Regional Vulnerability Screening Assessments of Transportation Infrastructure. *Risks*, 4(3), 28.
- 2015 **Nelson, K. S.**, Abkowitz, M. D., & Camp, J. V. (2015). A Method for Creating High Resolution Maps of Social Vulnerability in the Context of Environmental Hazards. *Applied Geography*, 63, 89-100.
- 2013 Wu, L., Luderer, M., Yang, X., Swain, C., Zhang, H., **Nelson, K. S.**, ... & Pan, D. (2013). Surface Passivation of Carbon Nanoparticles with Branched Macromolecules Influences Near Infrared Bioimaging. *Theranostics*, 3(9), 677.
- 2013 Wu, L., Cai, X., **Nelson, K. S.**, Xing, W., Xia, J., Zhang, R., ... & Shen, B. (2013). A Green Synthesis of Carbon Nanoparticles from Honey and their use in Real-Time Photoacoustic Imaging. *Nano Research*, 6(5), 312-325.

Peer-Reviewed Conference Proceedings

- 2015 **Nelson, K. S.**, Camp, J. V., Philip, C. E., & Abkowitz, M. D. (2015, September). *Navigable Inland Waterway Transportation Modeling: A Conceptual Framework and Modeling Approach for Consideration of Climate Change Induced Extreme Weather Events*. Paper presented at the World Association for Waterborne Transport Infrastructure (PIANC) Smart Rivers 2015 Conference, Buenos Aires, Argentina. Retrieved from http://www.pianc.org.ar/_stage/pdf/papers_sr2015/123_paper_Nelson_USA_7.pdf

Book Chapters, Reports and Other Publications

- 2018 **Nelson, K. S.** (2018). *Towards Quantitative Assessment of Vulnerability, Resilience, and the Effects of Adaptation on Social-Environmental Systems* (Doctoral dissertation, Vanderbilt University).
- 2018 Gunda, T., **Nelson, K.S.**, & Patel, N. (2018). *Sustainable Development: It's as easy as F-E-W (2017-2)*. Teaching Case Study. Annapolis: National SocioEnvironmental Synthesis Center. <https://www.sesync.org/sustainable-development-it%E2%80%99s-as-easy-as-f-e-w-2017-2>
- 2014 **Nelson, K. S.**, Winter, P., Shokeen, M., Wang, S., & Berezin, M. Y. (2014). Nanoparticles for Bioimaging. *Nanotechnology for Biomedical Imaging and Diagnostics: From Nanoparticle Design to Clinical Applications*, 151-192. John Wiley & Sons.
- 2010 Giammar, D.E., **Nelson, K.S.**, Noel, J. D., & Xie, Y. (2010). *Water Chemistry Effects on Dissolution Rates of Lead Corrosion Products*. Water Research Foundation Report 4064. Retrieved from <http://www.waterrf.org/PublicReportLibrary/4064.pdf>

PAPERS UNDER REVIEW

- 2019 **Nelson, K.S.**, & Camp, J. Quantifying the Benefits of Home Buyouts - Demonstration of an Approach and Application.
- 2019 Camp, J., **Nelson, K.S.**, Philip, C., Johnson, P., & Sheffler, D. Utilizing Agent-based Modeling to Evaluate Operational Impacts of an Incident and Possible Alternatives on U.S. Waterways.

WORKING PAPERS

Nelson, K. S. & Molloy, M. The Sociodemographic Landscape of Three Decades of FEMA Buyouts.

Nelson, K.S. & Burchfield, E. A Sensitivity Analysis of the Impacts of Landscape Composition and Configuration on U.S. Crop Production.

Nelson, K.S. & Nguyen, T. Community Assets and Relative Rurality: A New Metric for Rural America.

GRANTS

- 2019 US Department of Agriculture – Foundational and Applied Science Program, “Agricultural landscape management for improved sustainability: Quantifying relationships, barriers and opportunities”, July 2020 – June 2023, \$499,949 (PI) *pending*
- 2019 National Science Foundation - Smart and Connected Communities Planning Grant, “Leveraging smart technology to develop a safe and environmentally resilient watershed community”, July 2020 – July 2021, \$149,983 (co-PI) *pending*
- 2019 US Department of Education - Teacher quality partnership residency program, “T-SPARK (Teacher STEM Preparation Academic Residency for Kansas)”, October 2019 – Sept 2024, \$5,761,004 (collaborator) *pending*
- 2019 Kansas State University Center for Engagement and Community Development – Engagement Incentive Grants, “Building Our Sustainable Future through Community Engagement”, July 2019 – July 2020, \$7,000 (PI) *funded*
- 2019 Kansas State University – University Small Research Grants, “Understanding the Influence of Scale on Characterization of the Social Vulnerability of High Flood Risk Populations”, July 2019 – July 2020, \$4,240 (PI) *funded*
- 2018 National Science Foundation – Geography and Spatial Sciences, “Understanding the Role of Landscape Diversity in Agricultural System Function”, August 2019 – August 2021, \$308,493 (co-PI) *unfunded*
- 2017 Nashville Metro Water Services, “Converting Vulnerable Landscapes to Resilient and Sustainable Community Assets”, March 2017 – December 2017, \$62,500 (co-wrote) *funded*
- 2017 U.S. Coast Guard, “Elizabeth M Accident Evaluation Simulation”, August 2017 – July 2018, \$98,000 (co-wrote) *funded*

TEACHING

Courses Taught

- 2018 - 2019 **GEOG 508:** Introduction to Geographic Information Systems
Cross-listed graduate and undergraduate course in application of GIS to problem solving.
- 2019 **GEOG 360:** Sustainability Concepts and Issues
Undergraduate introductory course in sustainability concepts and systems thinking.
- 2019 **GEOG 821:** Research and Professional Development in Geography
Master's level introductory seminar on research methods and professionalization in Geography.
- 2018 **GEOG 610:** Internship in Geography
Faculty supervisor for independent student learning related to a concurrent internship.

Additional Training

- 2017 Funded Participant, National Socio-Environmental Synthesis Center (SESYNC) Short Course "Teaching Socio-Environmental Synthesis with Case Studies"
- 2016 Certificate in College Teaching, Vanderbilt University Center for Teaching
- 2016 Assistant Instructor, Geospatial Technologies (K-12 teacher professional development), Metropolitan Nashville Public Schools
- 2013 Teaching Assistant, Introduction to Environmental Engineering (undergraduate lecture course), Department of Civil & Environmental Engineering, Vanderbilt University
- 2006 - 2008 National Science Foundation Graduate Teaching Fellow in K-12 Education (part-time co-teacher), Environmental Science, Gateway Middle School, St. Louis Public School District

PRESENTATIONS

Paper Presentations

- 2019 Nelson, K. S, Burchfield, E. K., & Spangler, K. (2019, April). *Exploring the Impacts of Agricultural Landscape Diversity on Yields in the U.S. Using Bayesian Spatiotemporal Modeling*. Paper presented at the Annual Meeting of the American Association of Geographers Association of American Geographers (AAG), Washington D.C.
- 2018 Nelson, K. S (2018, October). *Exploring the Impacts of Agricultural Landscape Diversity on Yields in the U.S. Using Bayesian Spatiotemporal Modeling*. Paper presented at the Annual Meeting of the Great Plains/Rocky Mountain Division of the American Association of Geographers Association of American Geographers (AAG), Manhattan, KS.
- 2018 Nelson, K. S (2018, April). *Examining the Sustainable Resilience of an Urban System*. Paper presented at the Association of American Geographers (AAG) Annual Meeting, New Orleans, LA.

- 2017 Nelson, K. S., Dundon, L. A., & Abkowitz, M. D. (2017, June). *Quantifying Social Resilience and Evaluating Climate Change Adaptation Strategies*. Presented at the 3rd Climate Change Adaptation Conference (ECCA), Our Climate Ready Future, Glasgow, Scotland.
- 2017 Gillespie-Marthaler, L., Nelson, K. S., & Abkowitz, M. D. (2017, June). *Indicators for Assessing and Achieving Resilient and Sustainable Communities*. Presented at the 26th Annual Conference of the Society for Risk Analysis – Europe (SRA-E), Lisbon, Portugal.
- 2017 Nelson, K. S., Camp, J.V., Philip, C. E., & Abkowitz, M. D. (2017, January). *Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures*. Paper presented at the 96th Annual Meeting of the Transportation Research Board (TRB), Washington D.C.
- 2016 Nelson, K. S. & Burchfield, E. K. (2016, November). *Does the Structure of Water Rights Impact Agricultural Production During Droughts? A Spatiotemporal Analysis of California's Central Valley*. Paper presented at the Association for Public Policy Analysis & Management (APPAM) 38th Annual Fall Research Conference, Washington D.C.
- 2016 Nelson, K. S., Camp, J. V., Philip, C.E., & Abkowitz, M.D. (2016, June). *Navigable Inland Waterway Traffic Model for Evaluation of Tow Operation Procedures in the Context of Extreme Weather Events*. Paper presented in the Student Honor Panel of the 4th Biennial TRB-CMTS Research & Development Conference, Washington D.C.
- 2015 Nelson, K. S., Abkowitz, M. D., & Camp, J. V. (2015, April). *A Method for Creating High Resolution Maps of Social Vulnerability*. Paper presented at the Association of American Geographers (AAG) Annual Meeting, Chicago, IL.
- 2009 Giammar, D. E., Nelson, K. S., Noel, J. D., & Xie, Y. (2009, June). *Formation and Stability of Solid-Phase Lead Corrosion Products in Drinking Water Distribution Systems*. Paper presented at the AWWA Annual Conference and Exposition, San Diego, CA.
- 2009 Giammar, D. E., Nelson, K. S., Noel, J. D., & Xie, Y. (2009, March). *Influence of water chemistry on the stability of lead-containing phases present in drinking water distribution systems*. Paper presented at the 237th ACS National Meeting, Salt Lake City, UT. (March 22-26, 2009).
- 2008 Nelson, K. S. & Giammar, D. E. (2008, April). *The Influence of Water Chemistry on the Dissolution Rate of a Lead Phosphate Corrosion Product*. Paper presented at the Joint Meeting of the Missouri Water Environment Association and the Missouri Section of the American Water Works Association, Osage Beach, MO.

Poster Presentations

- 2018 Nelson, K. S. (2018, December). *The Value of Flood Mitigating Ecosystem Services Provided by a Home Buyout Program*. Poster presented at the American Geophysical Union (AGU) Annual Meeting, Washington D.C.
- 2016 Gillespie-Marthaler, L. & Nelson, K. S. (2016, December). *Resilience, Sustainability, and Vulnerability: Multi-Scale, Dynamic Interactions within Complex Systems and an Integrative Assessment Method*. Poster presented at the Society for Risk Analysis (SRA) Annual Meeting, San Diego, California.

- 2016 Gillespie-Marthaler, L. & Nelson, K. S. (2016, November). *Resilience, Sustainability, and Vulnerability: Multi-Scale, Dynamic Interactions within Complex Systems and an Integrative Assessment Method*. Poster presented at the Association for Public Policy Analysis & Management (APPAM) 38th Annual Fall Research Conference, Washington D.C.
- 2014 Nelson, K. S. (2014, February). *Environmental Justice Considerations Involving Rail Transport of Hazardous Materials*. Poster presented at the Logistics, Trade and Transportation (LTT) Symposium, Gulfport, Mississippi.

Invited Presentations

- 2019 Nelson, K. S. (2019, July). *Wildcat Creek Watershed as a Living Laboratory*. Presentation at the Fourteenth Annual Dialog on Sustainability: "Climate Change and Storm Water Management" hosted by the Consortium for Environmental Stewardship and Sustainability (CESAS), Kansas State University.
- 2019 Nelson, K. S. (2019, March). *Costs and Benefits of Flood Adaptation Strategies in Nashville, TN*. Presentation at the Kansas Chapter of the American Planning Association's (APA) Spring Symposium, Manhattan, KS.
- 2018 Nelson, K. S. (2018, October). *Challenges in Adapting to Urban Flooding*. Natural Resources and Environmental Sciences (NRES) Seminar Series, Kansas State University.

FELLOWSHIPS, AWARDS, & LICENSURE

- 2019 Civic Engagement Fellow, Kansas State University
- 2015 - 2016 Oak Ridge Institute for Science and Education (ORISE) Graduate Research Fellowship, U.S. Army Corps of Engineers Research Participation Program, May 2015 – October 2016, \$60,000
- 2013 - 2018 Harold Stirling Vanderbilt Graduate Honor Fellowship, Vanderbilt University
- 2006 - 2008 National Science Foundation Graduate Teaching Fellow in K-12 Education, Washington University in St. Louis
- 2006 Outstanding Senior in Environmental Engineering, University of Oklahoma
- 2006 Licensed Engineer Intern (EI), Oklahoma State Board of Licensure for Professional Engineers and Land Surveyors, License Number 13480

SERVICE

Outreach

- 2019 Guest Speaker, "What does a geographer do? (And how did you end up there?)" a discussion on interdisciplinary research and career paths, Kansas Louis Stokes Alliance for Minority Participation (KS-LAMP) Pathways to STEM summer research program

- 2016 Volunteer Instructor, Simplifying Complexity: The Wild World of Human-Environment Interactions, Tennessee Women in Science, Technology, Engineering & Research (TWISTER) STEM conference for girls in 9th to 12th grades
- 2012 Summer Focus Program Student Mentor, Effects of Gold Nanoparticles on *Danio rerio* (Zebrafish) Embryos, Washington University in St. Louis
- 2011 Research Experience for Teachers Program Mentor, Effects of Silver Nanoparticles on the Growth of *Arabidopsis thaliana*, Washington University in St. Louis

Professional Service

- 2019 Reviewer for *PLOS One*
- 2019 Reviewer for *Water Resources Research*
- 2018 NSF ad hoc reviewer (Geography and Spatial Sciences Program)
- 2018 Reviewer for *Water*
- 2018 Reviewer for *Urban Science*
- 2018 Reviewer for *Cities*
- 2015 Reviewer for *Applied Geography*

PROFESSIONAL AFFILIATIONS

Association of American Geographers (AAG)
American Geophysical Union (AGU)

TECHNICAL EXPERTISE

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| R (Statistical Programming Language) | NetLogo |
| ArcGIS | AnyLogic |